TOSHIBA Transistor Silicon NPN Epitaxial Planar Type

# MT6L78FS

#### VHF~UHF Band Low-Noise Amplifier Applications

Two devices are incorporated in a fine-pitch, small-mold package (6 pins): fS6.

- Superior noise characteristics
- Superior performance in buffer and oscillator applications
- Lead (Pb)-free.

#### www.DataSheet4U.coMounted Devices

	Q1	Q2
Corresponding three-pin products: fSM mold products	MT3S11FS	MT3S11AFS

## Maximum Ratings (Ta = 25°C)

Characteristic	Symbol	Rat	Unit		
Characteristic		Q1	Q2	Onit	
Collector-base voltage	V <sub>CBO</sub>	13	13	V	
Collector-emitter voltage	V <sub>CEO</sub>	6	6	V	
Emitter-base voltage	V <sub>EBO</sub>	1	1	V	
Collector current	Ι <sub>C</sub>	40	40	mA	
Base current	I <sub>B</sub>	10	10	mA	
Collector power dissipation	P <sub>C</sub> (Note 1)	100	90	m\\/	
		105 (Note 2)		11100	
Junction temperature	Тj	125		°C	
Storage temperature range	T <sub>stg</sub>	-55~125		°C	



Weight: 0.001g (typ.)

Note 1: 10  $\text{mm}^2 \times 1.0 \text{ mm}$  (t), mounted on a glass-epoxy printed circuit board.

Note 2: During two-element operation.

## Marking (top view)



#### Pin Assignment (top view)



# Electrical Characteristics Q1 (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Тур.	Max	Unit
Collector cutoff current	I <sub>CBO</sub>	$V_{CB} = 5 V, I_{E} = 0$	_		0.1	μA
Emitter cutoff current	I <sub>EBO</sub>	$V_{EB}=1~V,~I_C=0$		_	1	μA
DC current gain	h <sub>FE</sub>	$V_{CE} = 1V$ , $I_C = 5$ mA	100	_	160	_
Reverse transfer capacitance	C <sub>re</sub> (Note)	$V_{CB}=1~V,~I_{E}=0,~f=1~MHz$	_	0.65	0.9	pF
Transition frequency	f <sub>T</sub>	$V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}$	4	6	_	GHz
Insertion gain	S <sub>21e</sub>   <sup>2</sup> (1)	$V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}, f = 2 \text{ GHz}$	_	3.5	_	dB
	S <sub>21e</sub>   <sup>2</sup> (2)	$V_{CE} = 3 \text{ V}, \text{ I}_{C} = 20 \text{ mA}, \text{ f} = 2 \text{ GHz}$	4	6.5	_	
Noise figure	NF	$V_{CE} = 1 \text{ V}, \text{ I}_{C} = 5 \text{ mA}, \text{ f} = 2 \text{ GHz}$	_	2.4	3.2	dB

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# Electrical Characteristics Q2 (Ta = 25°C)

Characteristic	Symbol	Condition	Min	Тур.	Max	Unit	
Collector cutoff current	I <sub>CBO</sub>	$V_{CB} = 5 V, I_{E} = 0$	_	_	0.1	μΑ	
Emitter cutoff current	I <sub>EBO</sub>	$V_{EB}=1\ V,\ I_C=0$			1	μA	
DC current gain	h <sub>FE</sub>	$V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}$	100	_	160	_	
Reverse transfer capacitance	C <sub>re</sub> (Note)	$V_{CB}=1~V,~I_{E}=0,~f=1~MHz$	_	0.6	0.85	pF	
Transition frequency	f <sub>T</sub>	$V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}$	4	6	_	GHz	
Insertion gain	S <sub>21e</sub>   <sup>2</sup> (1)	$V_{CE}=1~V,~I_{C}=5~mA,~f=2~GHz$	_	3.5	_	dD	
	S <sub>21e</sub>   <sup>2</sup> (2)	$V_{CE}=3~V,~I_{C}=20~mA,~f=2~GHz$	4	6.5	_	uD	
Noise figure	NF	$V_{CE} = 1 \text{ V}, I_C = 5 \text{ mA}, f = 2 \text{ GHz}$	_	2.4	3.2	dB	

Note:  $C_{re} \mbox{ is measured with a three-terminal method using a capacitance bridge. }$ 

## Caution

This device is sensitive to electrostatic discharge. Ensure that tools and equipment are sufficiently grounded before handling. When handling individual devices (which are not yet mounted on a circuit board), ensure that the environment is protected against electrostatic discharge. Operators should wear antistatic clothing, and containers and other objects that come into direct contact with devices should be made of antistatic materials.

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